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PREVENTIVE MAINTENANCE. HONEYWELL PLANNING GUIDE.
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THIS HONEYWELL PAMPHLET DISCUSSES SOME ASPECTS OF PREVENTIVE MAINTENANCE OF AUTOMATIC CONTROLS, HEATING, VENTILATING, AND AIR CONDITIONING, AND COMPARES IN-PLANT WITH CONTRACT SERVICE, CONCLUDING THAT CONTRACT SERVICE IS PREFERABLE AND DESCRIBING A NUMBER OF MAINTENANCE PLANS WHICH THEY FURNISH. PREVENTIVE MAINTENANCE PROVIDES--(1) MORE EFFICIENT OPERATION, (2) FEWER BREAKDOWNS, (3) ANNUAL BUDGETING, (4) EXTENDED EQUIPMENT LIFE, (5) DIAGNOSIS OF WEAK POINTS, AND (6) ADVANCE DETERMINATION OF EQUIPMENT REPLACEMENT. COST AND CONVENIENCE ARE DESCRIBED FOR AUTOMATIC CONTROLS. TYPES OF MAINTENANCE AGREEMENTS ARE PROVIDED BOTH FOR CONTROLS AND FOR MECHANICAL SYSTEMS. ADVANTAGES OF A HONEYWELL MAINTENANCE PROGRAM ARE LISTED, INCLUDING--(1) THE BUDGETING OF ALL MAINTENANCE FOR THE YEAR, (2) REDUCTION OF BREAKDOWNS AND EMERGENCY SERVICE, (3) PARTS AND REPLACEMENTS KEPT IN STOCK, (4) AVAILABILITY OF TRAINED SPECIALISTS, (5) TOOLS, TEST EQUIPMENT, AND OTHER SUPPLIES OTHERWISE KEPT IN INVENTORY, AND (6) THE KEEPING OF COMPLETE RECORDS ON EQUIPMENT. (MM)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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HONEYWELL

PLANNING GUIDE

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PREVENTIVE MAINTENANCE

WHY PREVENTIVE MAINTENANCE?

We use preventive maintenance on our machines and equipment to assure top operating efficiency and prevent breakdowns

Electronic and mechanical machines and equipment are more numerous today than ever before. We use more of them and we demand more of them. They make us more efficient and productive; provide help, recreation and relaxation. They're a tribute to man's ingenuity . . . when they're working. And that's the problem. We have to maintain them to keep them working for us. But it's a small price when you think of it, when you consider the investment and what we get for it.

Take an automobile, shop equipment, lawn mower . . . home . . . heating . . . air conditioning system. We wouldn't be without them. But time means wear and deterioration. We know from experience that if we ignore disrepair, it won't go away. It will get worse, more expensive. Consider the automatic control system in your building. Like all mechanical systems it has a way of getting attention. It will break down, become less efficient and reliable, every day it goes uncared for. This booklet outlines the importance of systematic preventive maintenance for both automatic controls and complete mechanical heating, piping, and air conditioning systems.

Preventive maintenance is the logical way to eliminate problems and save money

Most of us don't even think about it. If the house needs a new light switch, paint or plumbing, we get it done before it can cause a serious problem and a big repair bill. Same for the car, shop equipment, boat, mower, what have you. We depend on machines and systems, so we've learned to take care of them. In the process we've found the best way is to be systematic about it. Check, tune and adjust periodically. Replace parts when necessary.

Preventive maintenance. Maybe we don't use the name but that's what we're doing. It helps us get a full return on our investment by controlling deterioration and preventing the unexpected, costly breakdowns that lead to premature replacement of parts or entire systems. It assures a consistently high level of performance from equipment and at the same time preserves the life of its working parts.

MAINTENANCE FOR YOUR CONTROLS

A preventive maintenance program protects your investment in automatic controls by guarding against early deterioration

Magnify the problems of faulty maintenance around the house and you can see why a preventive maintenance program is even more essential to your building's pneumatic and electric controls. First of all, these controls are automatic and unfamiliar to the average mechanic. They regulate other equipment, such as an air conditioning or heating system and lack of maintenance or poor maintenance can shut down and even damage the entire system.

Automatic controls require periodic inspections and adjustments. Here, a maintenance man is checking a wall thermostat.

Second, your dollar investment in automatic controls is often much greater than in a home, shop equipment or an automobile and therefore, the risks of faulty maintenance can be much costlier. Breakdown service is more expensive and the consequences of uncontrolled deterioration are more severe. Hundreds of thousands of dollars may be lost early through deterioration, requiring premature replacement of controls or parts.

Finally, the comfort, safety and working efficiency of many building occupants are dependent on how well your automatic controls operate.

Poor maintenance leads to expensive breakdowns, discomfort and inefficiency

In spite of these basic considerations, some building owners are unaware of the importance of a preventive maintenance program for their controls. That is, they must experience the pitfalls before they recognize the need. For example:

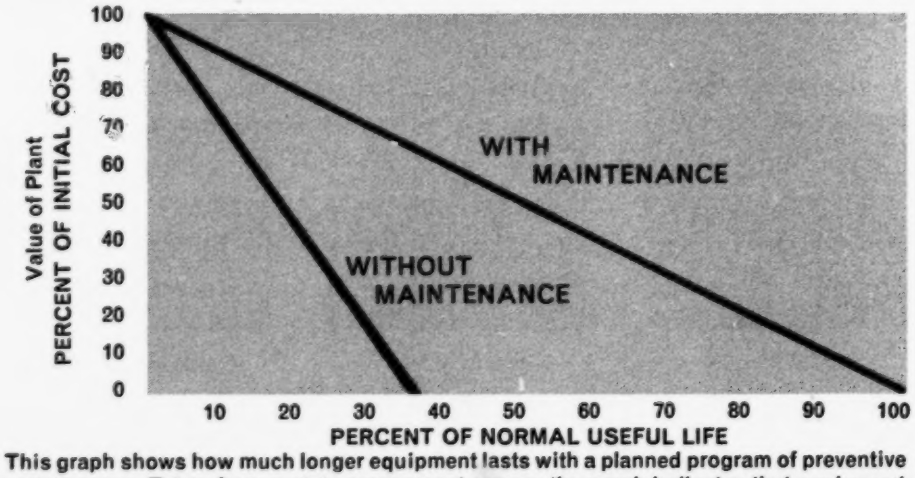
In a new million dollar office building, an operations manager was assigned the job of "keeping an eye" on the air conditioning system. He also had bookkeeping and other supervisory functions to look after and lacked both the time and the know-how to maintain

automatic controls. Even though he was given the operating and maintenance instructions immediately after installation, he didn't have the time to read them.

On a hot summer day, several emergencies developed and the operations manager was unable to cope with them: (1) The air conditioning system failed to cool the main area because the chilled water temperature controller needed adjustment; (2) a conference room got too cold when the damper linkage slipped; and (3) an exhaust fan failed to work because the timer was off schedule. All of these malfunctions were caused by neglect of the system. To put them in order required emergency service and the added expense of parts replacement.

Along with the expense and discomfort caused by emergencies such as these, there is another cost. Sudden changes in room temperature make office personnel uncomfortable and lethargic and impairs their working efficiency. This loss in productivity is hard to determine in dollars and cents, but it never should be disregarded when considering the consequences of equipment breakdowns in commercial buildings.

Control system failures can also endanger property, personnel and equipment. A faulty valve or temperature limit control could damage expensive allied equipment. Consider, for example, what would happen if fire detection and alarm equipment failed to operate in an emergency, if a clock programming system was out of phase, or if security and equipment surveillance systems malfunctioned.



This graph shows how much longer equipment lasts with a planned program of preventive maintenance. Taken from a state government survey, the graph indicates that equipment serves less than 40% of its normal life without a maintenance program.

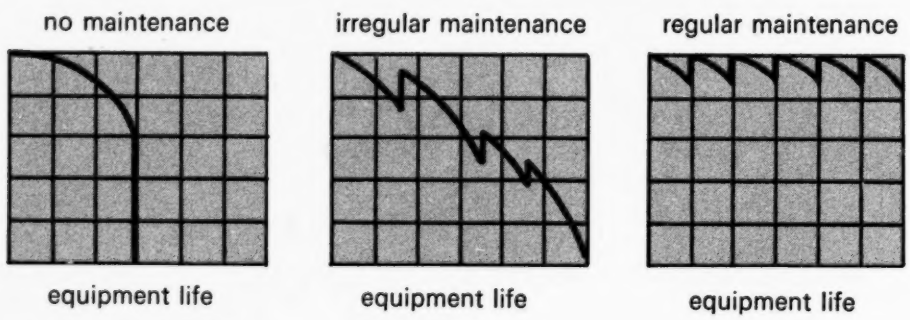
HOW YOU BENEFIT

A good maintenance program will save money and keep your system in optimum operating condition

Now that you have seen what can happen without preventive maintenance, let's look at how these problems can be avoided when your controls are properly maintained. Here are some specific advantages of a sound maintenance program:

- Automatic controls will operate more effectively and the equipment they regulate will perform with peak efficiency.
- Money can be saved because there will be fewer breakdowns and less need for emergency service and early part replacement.
- Budgeting each year's maintenance costs is easier, more accurate.
- Useful life of controls will be extended and deterioration will be controlled.
- Determine the causes of breakdowns and pinpoint weak spots systematically.
- Determine in advance when equipment replacement will be necessary.

There are other advantages depending on whether you decide to have maintenance handled internally by the building maintenance crew or by agreement with the manufacturer. But regardless of the type of program, preventive maintenance will save you money. The amount of saving will vary, but studies have shown that a sound program will cut maintenance costs by as much as 25%.



These graphs show at a glance what preventive maintenance can do for your control system. In the graph at the left, the system is neglected and control life is shortened. In the center graph, maintenance is undertaken in an irregular way and service and investment suffer. In the graph at the right, the system is scientifically maintained and the life of the control is extended to give maximum service.

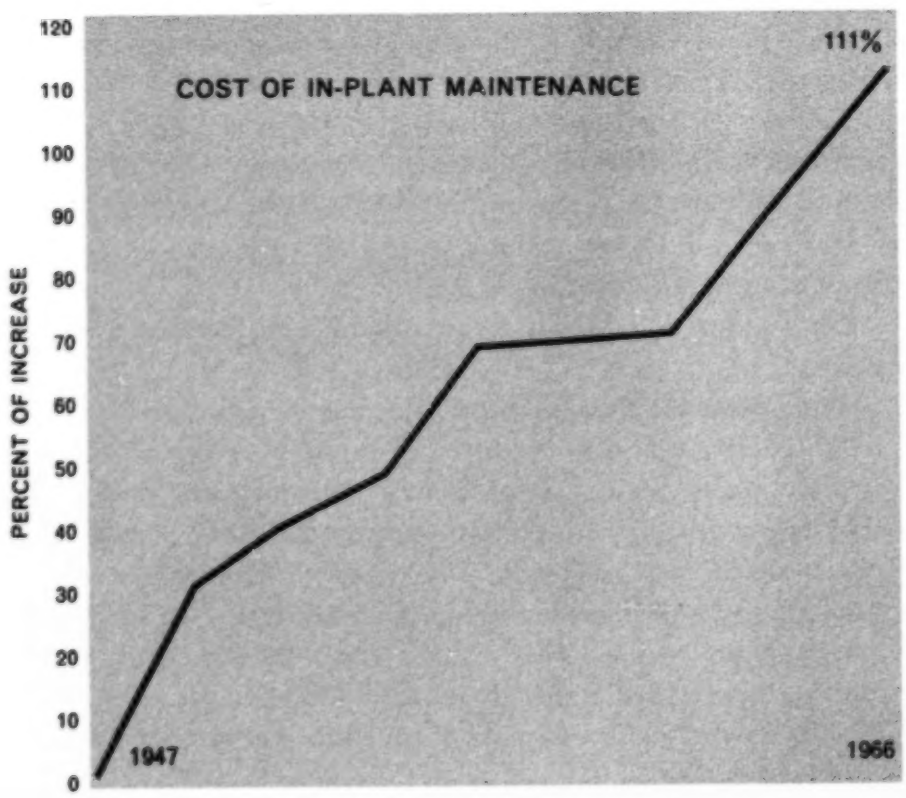
CONTRACT OR DO-IT-YOURSELF?

Many building owners are turning to contract service because of steadily increasing in-plant costs

You've seen some of the benefits of preventive maintenance, but an important question may remain: Is preventive maintenance handled more efficiently with an in-plant program or by contract with the control manufacturer?

The present trend points to more contract service, especially in larger buildings with extensive control systems. In other words, the bigger and more complex the maintenance job, the greater the tendency to turn it over to the outside contractor.

There are several reasons for this. First of all, preventive maintenance for automatic controls is specialized maintenance. A large building requires a sizable staff of technicians, plus an effective training program to up-date skills. Sometimes skilled labor is not available. And, when it is available, plan on paying the prevailing wage rates for specialists and allow a liberal amount for in-service training.



But these are only a few of the costs of an in-plant program. In addition, there are overhead costs such as vacation and sick pay and Social Security and unemployment taxes. An internal program also involves an inventory of spare parts for emergency repair. It requires purchases of special tools and test instruments. And it necessitates efficient record-keeping.

To determine whether in-plant maintenance or contract service is more expensive, a study was prepared by Honeywell for one of its customers. The comparative analysis of costs showed that a maintenance contract for one year would amount to $2,915, whereas control maintenance service by in-plant personnel would total $4,154.

Actually, the cost of in-plant maintenance has been rising steadily during the past few years. In fact, it has increased by more than 111% since 1947.

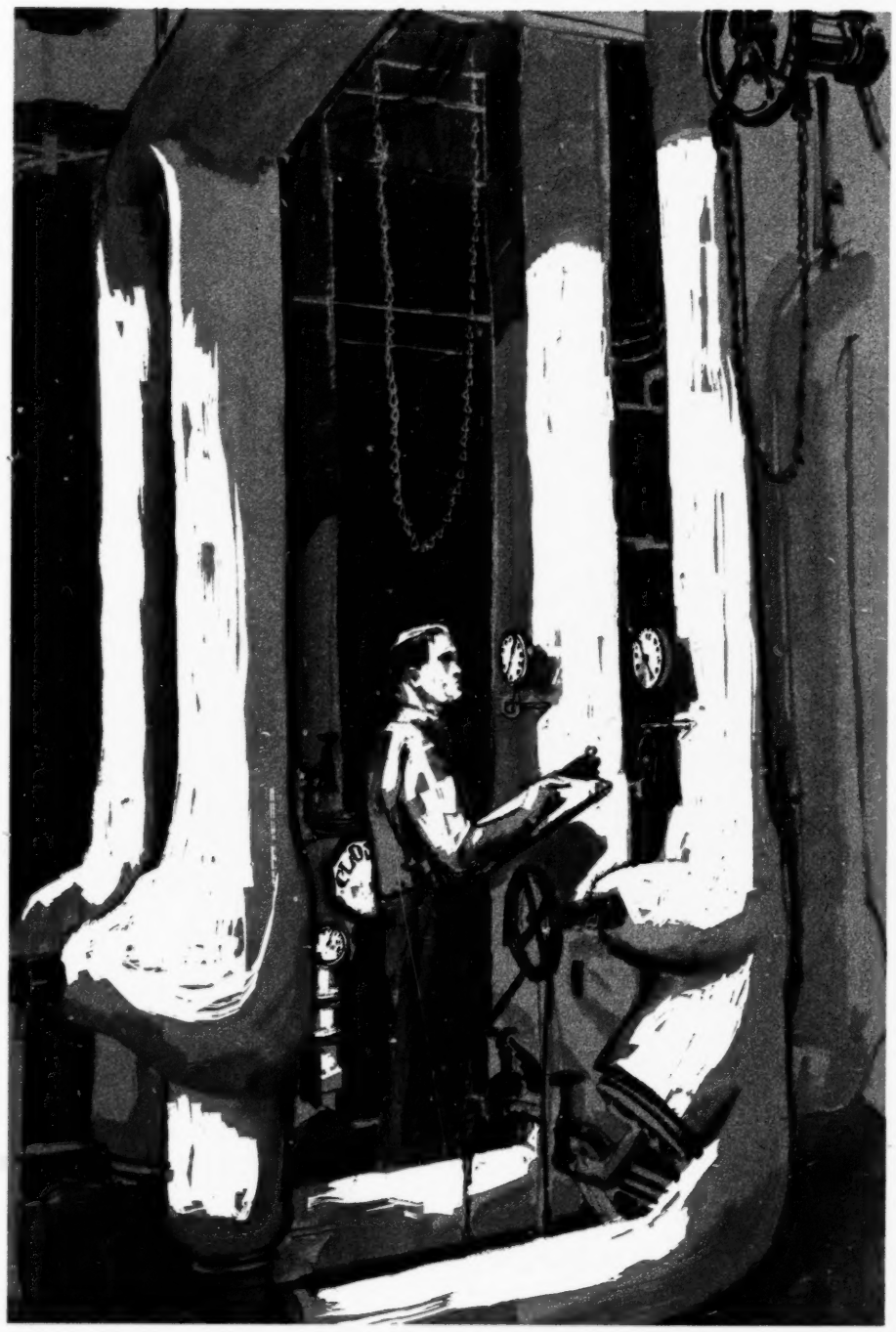
Control manufacturers offer large, well-trained staffs for fast, efficient service

Direct costs aren't the only consideration, however. Time and efficiency should also be taken into account. If production in a building depends on continuous operation of controls, mistakes and time lost in repairing a breakdown can be quite critical.

Most control manufacturers feel that they can provide service faster and more efficiently than an in-plant staff. They offer large staffs of well trained men whose full time job is to service automatic controls. Few building maintenance staffs can even attempt to match this kind of specialization.

Honeywell often points to the importance of time and efficiency factors:

> "The striking difference in the cost of your personnel performing this maintenance and our personnel is the difference in time it would take to service the equipment. Our men, who deal with this equipment day in and day out, are able to perform this work quickly and efficiently. If needed, we would replace any and all equipment at no additional cost to you. You are completely protected against cost of replacements. Any emergency service is provided promptly at no added cost to you. This results in a minimum amount of time lost due to temperature control problems."

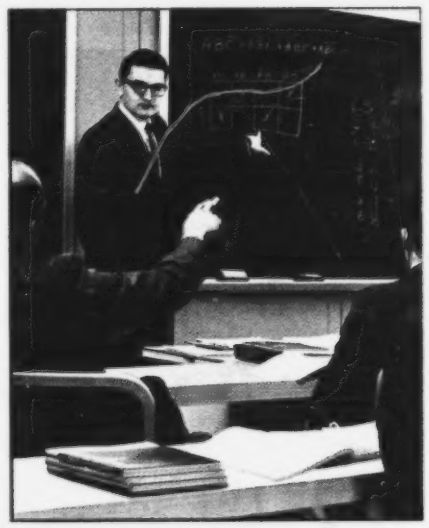


Maintenance of complex heating and cooling controls requires specialized knowledge. Control manufacturers offer large staffs of skilled manpower with the training and experience needed to handle maintenance quickly and efficiently.

Contract service relieves the expense of hiring and training skilled control technicians

One of the most important advantages of a maintenance contract is the pool of skilled manpower available. Some "in plant" manpower is necessary to handle routine maintenance, such as turning the system on and off, making minor adjustments and watching for unusual changes in performance. But the specialized skill needed to perform preventive maintenance on automatic controls is seldom found among routine maintenance employees.

Temperature controls are highly sensitive instruments. Maintaining them demands a thorough understanding of control design and function as well as the equipment they regulate. Only a man with specialized training and experience can be expected to know whether the controls are operating at peak efficiency, and if not, what corrective action to take. This basic system design fact introduces a "built in" problem when maintenance is handled internally: Selection and training of manpower.



Modern training for technicians makes preventive maintenance an asset.

As control system technology increases in complexity, skill and training become more and more important. Most firms handling their own preventive maintenance place strong emphasis on technical training and experience in selecting maintenance employees. They recognize that existing manpower skills can easily become outmoded by sudden changes in technology. Failure to employ competent men and train them leads to lost time, mistakes and inefficiency. Preventive maintenance becomes haphazard and tends to be a liability rather than an asset.

Skilled manpower and in-service training programs, however, increase maintenance costs. Higher wage rates must be paid to skilled workers, and the expense of training staff, classrooms, equipment, supplies and trainee time expand the maintenance budget even more.

HONEYWELL'S MAINTENANCE PROGRAM

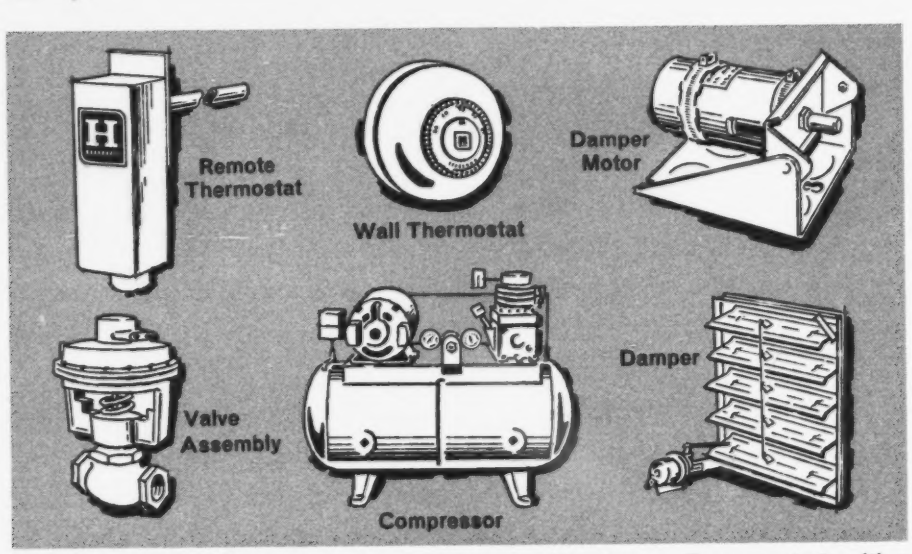
Honeywell will survey your control system, set up a maintenance schedule and keep up-to-date records

Honeywell follows these three basic steps in setting up a program of preventive maintenance: First a survey of the control system, then a maintenance outline is set including the type and frequency of maintenance for each of the controls, and finally a system of records is established.

A survey of the system involves checking all controls

A maintenance program starts with knowledge of the control system. This includes an inventory of all controls, where they are located, their operational characteristics, and how often they must be inspected, adjusted and lubricated.

Using a pneumatic control system as an example, these are some of the components and operational characteristics Honeywell will survey:



If you have a pneumatic control system, Honeywell's Maintenance Program starts with a survey of all of the above controls.

1. Compressor—Check starter, pressure switch, safety relief valve, pressure reducing valve, type and condition of belts, pump-up time, frequency of operation, exhaust and intake valves, oil filter, air intake and electric motor.

2. *Thermostats* (*Room and Remote*)—Record the following information: make, model, function, number of pipe connections and condition.

3. *Valves*—Record the following information: Make, model, function, size, pattern and condition; look for rusted, corroded or broken top parts, leaking packing and leaking diaphragms.

4. *Motors*—Take down the following information—Make, model, function, size and condition.

5. *Dampers*—Record the number and size of all dampers: special attention will be given to outside air, exhaust and air washer dampers.

6. *Individual Room Controls*—List the rooms with controls, including types of thermostats and valve patterns and sizes.

A maintenance schedule indicates the type and frequency of maintenance

After an inventory of the controls in the system has been made, Honeywell will set up a maintenance schedule indicating the frequency of inspections and maintenance services required. If the control system is new, Honeywell will probably follow the recommended schedules established in the Company's maintenance manuals.

However, several factors necessitate adjusting the normal recommended schedule. Among these are:

Age and Condition: The older the system, the more frequent the inspections until it is decided the controls are ready for replacement.

Severity of Service: If controls are used more often than normal or under heavy load conditions, they will require more frequent inspections.

Reliability: If a system must operate without breakdown because of production demands, more frequent inspection is necessary.

Exposure to Dirt and Corrosion—Controls exposed to extreme conditions might become susceptible to wear and should be inspected more often.

A maintenance schedule also indicates the type of service required and the number of manhours needed to perform it. Minimum maintenance procedures are spelled out in manufacturer's manuals—but the type and extent of the maintenance is related to the age and condition of the controls.

TYPICAL MAINTENANCE SCHEDULE FOR PNEUMATIC CONTROLS*

EQUIPMENT	SERVICE REQUIRED	FREQUENCY
Compressor (air supply)	Drain and inspect tank; check crankcase oil level	Weekly by Equipment Operator
Compressor	Clean intake air filter, check pressure reducing valve setting, inspect air filter	Every six months
Compressor	Drain crankcase oil, oil electric motor	Every six months
Compressor	Check for moisture, oil and dirt in lines; oil compressor motor: check compressor belt; check pressure relief valve; check compressor pressure switch	Every six months
Thermostats	Check calibration and throttling range; also nozzle and restrictor of bleed-type	Every six months
Humidity Controllers	Check calibration and throttling range; clean humidity element; check nozzle and restrictor	Every six months
Pressure Controllers	Check calibration and throttling range; check pressure control piping; check nozzle and restrictor; check static pressure regulator oil level	Every six months
Dampers	Lubricate damper bearings; check damper travel and close-off	Every six months
Valves	Lubricate stem; adjust packing or replace; check for light close-off	Annually
Relays	Check electric to pneumatic and pneumatic to electric relay operation; check positive positioner relay operation	Annually
Switches	Check diverting switch operation; check graduate switch calibration	Annually

*Manhours needed to perform the maintenance frequently appears in maintenance schedules but is omitted here because experience and local conditions cause wide variances.

Records are kept on all controls in the system

An effective maintenance program requires a system of record-keeping. These records must include all information necessary to maintain the control system.

The Honeywell Branch Office nearest you will maintain a complete file of records on the controls in your building. These will include a maintenance plan, a schedule form and service report. The maintenance plan lists all of the equipment in the system with remarks on operating efficiency. The schedule form indicates the type of maintenance to be performed and the frequency of performance. The service report form shows what maintenance or repairs were made on each inspection.

All of these records are available to you on request. By keeping accurate, up-to-date records on all the controls in your system, Honeywell relieves you of the expensive and time consuming responsibility of maintaining files of information on your equipment.

Maintenance records on your control system are kept at your nearest Honeywell Branch Office. They are always available to you for inspection.

TYPES OF MAINTENANCE AGREEMENTS

Most control manufacturers offer several types of maintenance agreements to help you tailor your program to the needs of the building. Honeywell, for example, provides these basic types of contracts:

1. Time and Material Periodic Maintenance—Honeywell agrees to make scheduled preventive maintenance inspections and bills the customer for labor and material.

2. Fixed Price Periodic Maintenance—This plan makes it easier for the customer to budget the money he will need for maintenance. Under this system, Honeywell makes regularly scheduled periodic maintenance inspections and bills the customer a fixed price for labor. Parts and replacements are billed separately.

3. Fixed Price Periodic Plus Emergency Service—This contract goes one step further and provides the labor for both regular inspections and emergency service at one fixed annual cost. Parts and replacements are still billed separately.

4. Honeywell Maintenance—This is a complete program under which all maintenance variables can be budgeted at a fixed annual cost. You get regular maintenance inspections, any emergency service required, and all parts and replacements.

In addition to these basic types, Honeywell will also customize a maintenance program to meet any special need.

Honeywell Maintenance offers "Total Responsibility" control system care

Honeywell's Maintenance Plan is a complete program that can provide important benefits.

Here are some specific advantages:

1. You can accurately budget all maintenance costs, including periodic inspections, emergency service, parts and replacement devices—in fact, anything required to keep equipment in top condition.

2. Honeywell relieves you of the responsibility of stocking parts and replacements.

3. A trained staff is available at all times for any emergency.

4. Honeywell furnishes tools, test equipment and other supplies which you would otherwise have to carry in inventory.

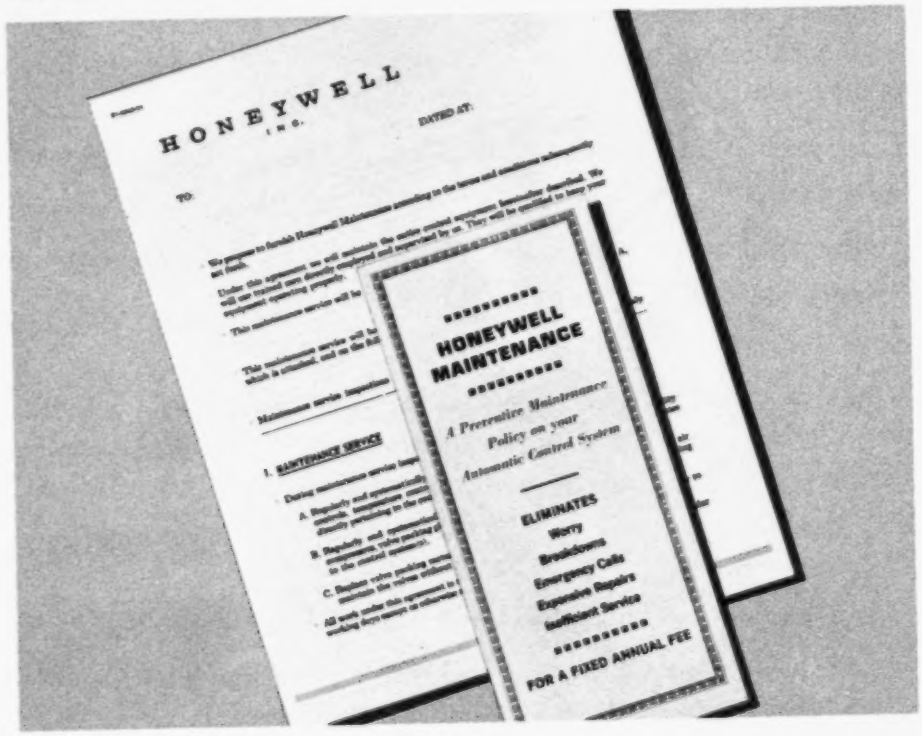
5. Honeywell maintains complete records on your equipment and provides clerical, accounting, insurance and tax services to assure a well managed system.

6. Honeywell's temperature control specialists are members of your maintenance team. They are glad to answer questions and aid your staff in analyzing problems which arise in allied heating and ventilating equipment.

7. Honeywell's engineers are available for special engineering assistance on control problems.

The four types of maintenance agreements Honeywell offers give you partial flexibility in selecting a plan. If you have a small building with only a few controls, you may prefer either time and material or fixed price maintenance. But if your control system is extensive and your maintenance needs are much greater, you may want added protection against emergency service and equipment replacement.

The point to remember is that maintenance contracts are a form of insurance. They offer as much or little protection as you want. If you select unwisely and under-insure your controls, you must bear the expense.



WHY MECHANICAL MAINTENANCE?

Complete preventive mechanical maintenance for your automatic control, heating, air conditioning and ventilating system can also mean important benefits

Just as automatic controls require preventive maintenance to keep them in efficient operating condition, entire building systems can benefit from the care of a mechanical maintenance program.

New technology: Increased use of air conditioning, bigger, more sophisticated heating and ventilating systems in modern buildings and the proliferation of work saving mechanical equipment; all have contributed to the new burden of maintenance. Today, maintenance is expected to keep equipment running more efficiently for longer periods. As technology has placed a new burden on maintenance, it has become in many cases part of a total system approach called mechanical maintenance.

Mechanical maintenance describes a program in which the continuous wear and changes a mechanical system will undergo during operation are anticipated and continuous corrective action is taken to minimize deterioration. This requires periodic inspection and the replacement of components to prevent equipment failures as normal wear takes place. In its various forms, mechanical maintenance involves a planned and controlled program of inspections, adjustment, repairs and an analysis of performance designed to keep a system operating at total efficiency.

Just as automatic temperature controls continue to give high performance with proper maintenance, periodic check-up, adjustments and parts replacement, the same is true for the entire mechanical system. Only a carefully planned and executed maintenance program will assure, in operation, a well designed system's potential and freedom from costly accidents to major components.

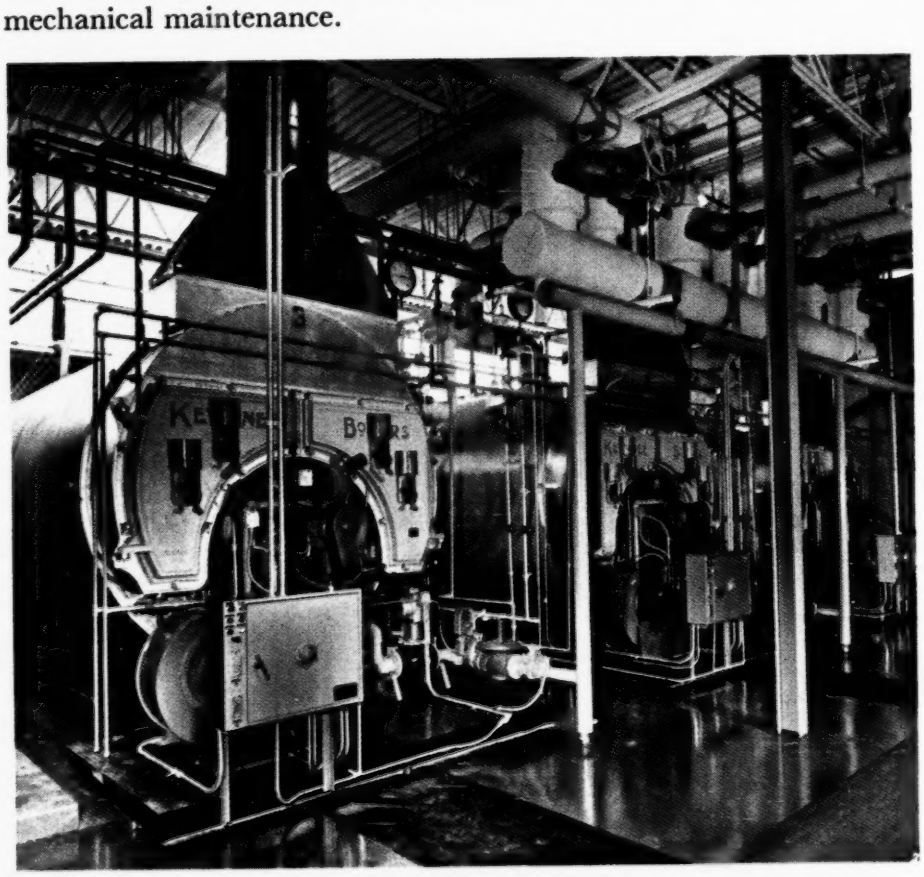
Key to system efficiency: gearing mechanical maintenance to system requirements

Manufacture, design and installation: all influence the maintenance burden of a mechanical system, but none of these has as great an effect on maintenance as preventive mechanical maintenance or the lack of it.

The effectiveness of a mechanical maintenance program is determined largely by the way the plan is matched to the system to be maintained. Planned maintenance, suited to the mechanical design of the system, can provide certain distinct advantages. Among them: Greater system dependability. Less large scale repair work. Extension of useful equipment life. Minimum standby equipment required. Causes of breakdowns and areas of weakness can be identified. Operating efficiency can be maintained. And, data can be obtained to determine when equipment replacement is necessary.

Savings can be an important benefit with a proper mechanical maintenance program

Many of the important benefits of mechanical maintenance can be related to reduced operating costs. In general, industry has found that maintenance costs for mechanical equipment can be reduced as much as 25%. This, of course, assumes a well managed program of mechanical maintenance.



Planned mechanical care for heating system boilers protects investment, maintains efficiency.

What makes for a well maintained mechanical system?

There is essential industry agreement that the need for maintaining heating, piping and air conditioning systems increases with age, complexity of equipment and value of the system. Requirements vary widely from system to system.

To meet this range of needs mechanical maintenance may take several forms. Whatever the choice, however, successful preventive maintenance plans have a basic similarity of makeup:

- good maintenance management policies
- an inventory of the plant
- planned and scheduled work
- standardized operation and maintenance procedure
- trained personnel
- adequate system of records
- program for review . . . schedules and reporting

Basically, mechanical maintenance can be accomplished in three ways: In-plant; In-plant plus Outside contract; Outside contract.

In-Plant: This simply means that all mechanical maintenance is done by plant personnel with plant equipment. It usually means that a system of records must be kept, parts must be stocked and a plan of preventive maintenance formulated. All maintenance staff, equipment and indirect expenses and responsibility are generally directed by an in-plant maintenance supervisor.

In-Plant Plus Outside Contract: This method combines in-plant and outside contracting. It assumes personnel hiring, training and management responsibility as well as records and parts stock. The same staff expenses, equipment expenses and indirect expenses (office and shop space, heat and lights, supplies and records) that occur in the "in-plant" method are included with special outside contracting of certain maintenance functions with a firm specializing in mechanical maintenance.

Outside Contract: Contracting maintenance means the entire job of in-plant maintenance is turned over to an outside firm. For a contract fee, usually on an annual basis, the maintenance firm provides the tools, time records, parts and skilled personnel to provide systematic maintenance of the entire mechanical system.

Statistics indicate that about 80% of industrial firms now contract out at least part of their maintenance work and the total man hours provided in the U.S. by maintenance firms tripled from 1958 to 1963. About 15% of the companies contract out over 20% of their work.

Systems account for growth of contract maintenance

Many of the reasons for the growth of contract maintenance can be found in modern automatic controls, heating, air conditioning and ventilating systems. Today, they are infinitely more complex and improvements are being added at an amazing rate. More sophisticated systems require more skilled technicians and equipment.

Survey shows the need for skill

Not long ago, for example, an industry magazine surveyed 140 firms regarding their maintenance programs. The survey indicated a high positive response to the preventive maintenance role in cutting machine downtime, improving product quality and cost cutting. The chief complaint from companies was that their maintenance force lacked the skills to take care of new automated equipment and machines.

Another survey pointed out some other interesting implications of preventive mechanical maintenance:

Causes Of Failure In Central Air Conditioning Systems

Insurance inspections point out the causes of recent breakdowns in industrial central air conditioning systems and what preventive maintenance can do to prevent such failures through planned examinations, replacement of parts, adjustments, calibration, cleaning and lubrication.

Component	Cause of recent accidents to central air conditioning						
	Freezing	Corrosion	Erosion	Vibration	Defective material	Workmanship	Other
Chillers	33	3	2	–	3	–	1
Condensers	5	9	1	1	2	–	2
Control piping	–	–	1	18	4	8	1
Refrigerant piping	2	1	6	37	4	8	1
Chilled water piping	–	–	–	2	1	–	–
Heating coils	11	1	–	–	–	–	–
Chilling coils	3	–	–	–	–	–	–
Evaporative condensers	–	–	–	1	1	–	–
Expansion valves	–	–	1	–	4	–	–
Direct expansion evaporators	–	–	–	1	2	–	–
Totals	54	14	11	60	21	16	5

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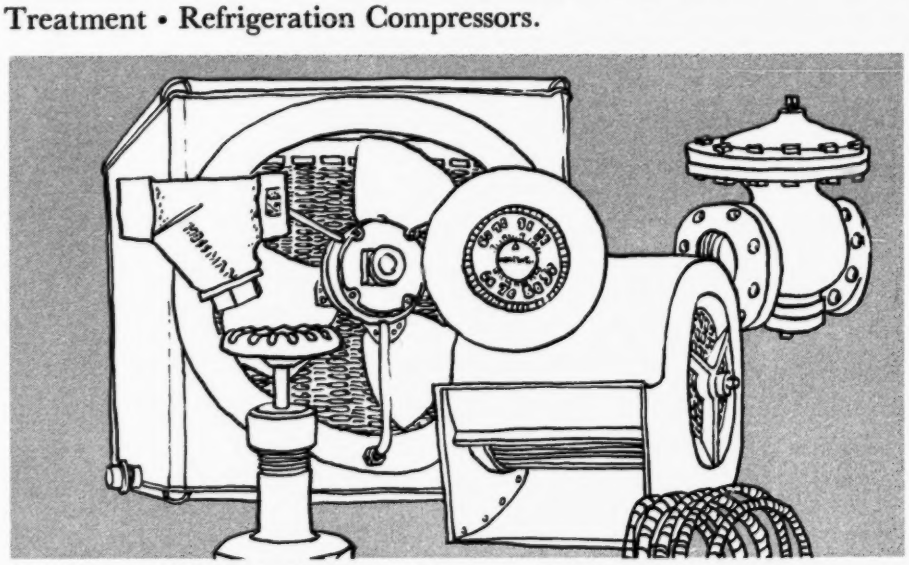
HONEYWELL'S
MECHANICAL MAINTENANCE PLAN

While preventive control maintenance is designed to keep automatic temperature controls in proper working order, Honeywell Mechanical Maintenance provides maintenance care for the entire heating, air conditioning and ventilating system.

It includes general maintenance, component replacement and emergency service: performance checks, examinations, adjustments, calibration, cleaning and repairs.

Honeywell Mechanical Maintenance includes systematic care for:

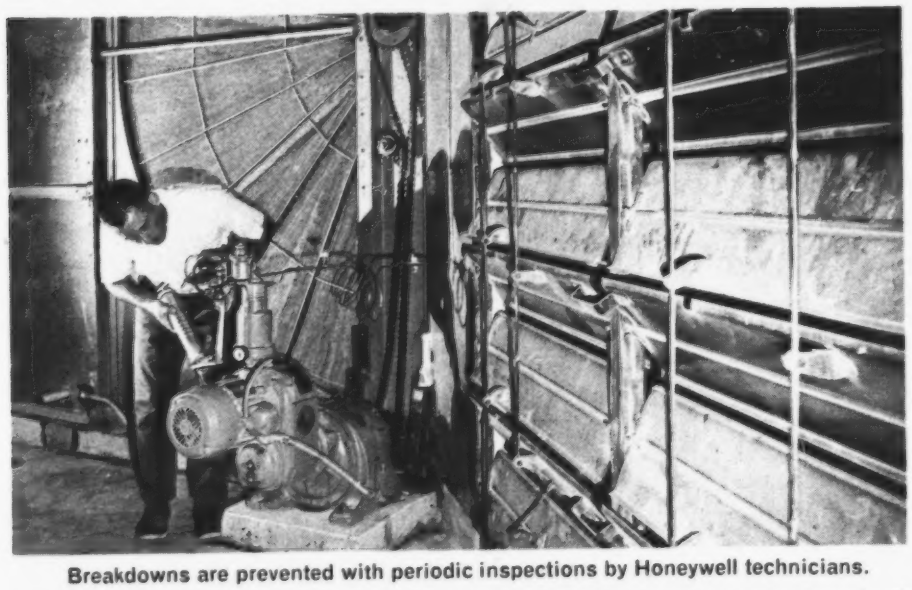
Thermostats • Motors • Boilers • Air Compressors • Valves • Heat Exchangers • Roof Ventilators • Fans • Burners • Filters • Air Handling Units • Unit Heaters • Condensate Pumps • Circulators • Radiator and Traps • Cooling Tower • Water Treatment • Refrigeration Compressors.



Honeywell Mechanical Maintenance includes the entire mechanical system.

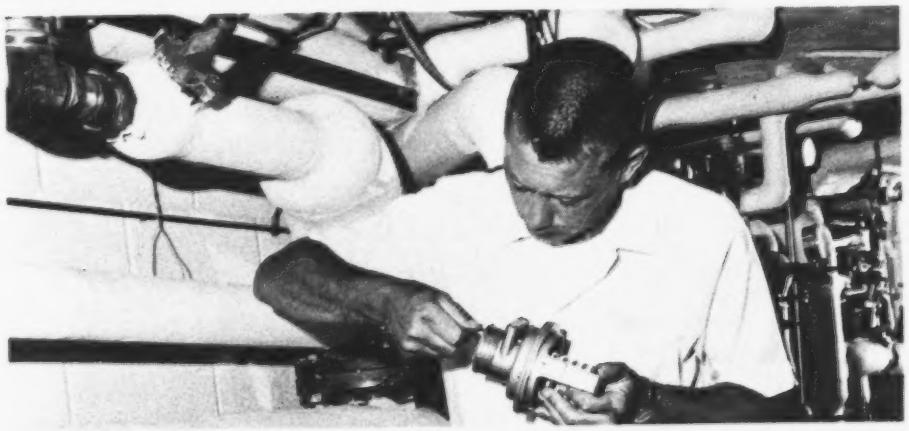
Honeywell Mechanical Maintenance is built around the mechanical system using the TOTAL RESPONSIBILITY approach. This means general maintenance, component replacement and emergency service are combined in a preventive maintenance program that's designed to reduce emergency calls, breakdowns, expensive repairs and inefficiency. Honeywell takes full responsibility for the efficient operation of your system.

General Maintenance: General maintenance includes regularly scheduled examinations, adjustments, calibration, cleaning and lubrication. During inspections, all components are checked for wear and inefficient performance. Frequency of inspection is determined by the age of the system, load conditions and environmental conditions. Records are maintained by Honeywell and are available on request.



Breakdowns are prevented with periodic inspections by Honeywell technicians.

Component Replacement: With the Honeywell Mechanical Maintenance Program, any worn or faulty component is repaired or replaced automatically before breakdown. It includes replacement of components such as bearings and valves at no additional cost.



Component care keeps controls and equipment performing at peak efficiency.

Emergency Service: Honeywell's Mechanical Maintenance Plan is designed to eliminate emergency calls because inefficient and marginal components are detected and replaced before they can cause a breakdown. But if an emergency does develop, Honeywell has specialists on call to put the system back in perfect operating condition promptly and at no additional cost. Honeywell assumes complete responsibility for all covered systems.

Stand by emergency service is a basic part of Honeywell's Mechanical Maintenance.

Fixed Fee: Honeywell's Mechanical Maintenance Plan guarantees a fixed yearly budget for repair and service of the complete automatic control, heating, air conditioning and ventilating systems. It means you can budget an exact amount for maintenance each year to keep your system in peak operating condition.

With Honeywell Mechanical Maintenance
you eliminate specific cost factors
from your maintenance budget:

Staff Expenses: wages • training programs • insurance • secretarial help • employee benefits • management responsibility

Equipment Expenses: trucks and maintenance • insurance • special tools • test equipment • parts stock • reference library

Indirect Expenses: office and shop space • heat and light • communication facilities • record keeping • inefficient use of time.

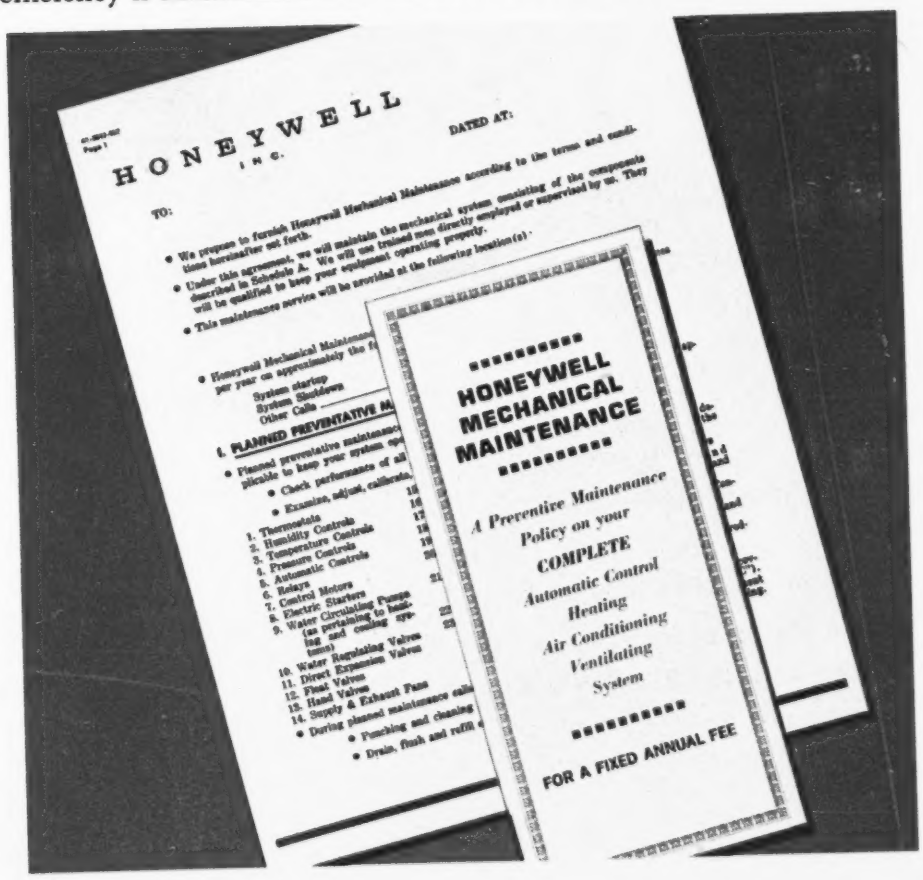
With Honeywell Mechanical Maintenance you can add these money-saving factors:

Economy: In the long run, regular maintenance is less expensive than none at all or haphazard maintenance. But there are other economies, too: an efficient system means reduced fuel and electric costs.

Efficiency: Honeywell Mechanical Maintenance experts are trained to recognize problem areas, and they have the know-how to correct them immediately. You avoid calling in a variety of specialists.

Protection: A well maintained system assures you of having up-to-date equipment that will not break down at a crucial time. Components are replaced when needed. Obsolescence is delayed.

Comfort: Honeywell Mechanical Maintenance makes sure your system delivers what was expected of it when it was new. Personnel efficiency is maintained and unsafe conditions are minimized.



HONEYWELL MECHANICAL MAINTENANCE IS FULL SYSTEM CARE

Honeywell can provide a preventive maintenance policy for your new or existing automatic control, heating, air conditioning and ventilation system that can mean important benefits.

Here are some of the important advantages in detail:

1. Budget accuracy for all maintenance costs for the year.

2. Breakdowns and emergency service can be practically eliminated.

3. Honeywell takes the responsibility of stocking parts and replacements.

4. Trained specialists are available for any emergency.

5. Honeywell provides tools, test equipment and other supplies which you would otherwise have to carry in inventory.

6. Honeywell keeps complete records on your equipment and provides clerical, accounting, insurance and tax services as well.

Selection of a maintenance program

Before you select a maintenance program to handle your building's needs, you will want to consult your engineer. He can advise you about any special considerations which might apply to your particular installation. And he can suggest the type of maintenance program best suited to your system.

Honeywell technicians in sales and service facilities throughout the country will be glad to help. A Honeywell office is as near as your telephone.

FOR FURTHER INFORMATION

Whatever your building requirements may be, Honeywell can provide technical assistance, systems and components in these technologies:

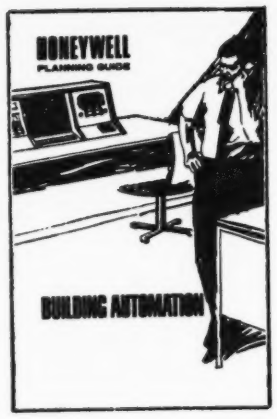
- Building Automation
- Temperature Control
- Security
- Fire Detection
- Equipment Surveillance
- Clocks

In addition, Honeywell provides all supporting services, such as maintenance programs and personnel training in the operation of these systems.

For a thorough discussion of exactly what Honeywell's capabilities can mean to you and your building, call your local Honeywell Commercial Division Branch Office. Honeywell is listed in the Yellow Pages under "Controls, Control Systems & Regulators". Or if you prefer, write to Honeywell, Commercial Division, 2701 Fourth Avenue South, Minneapolis, Minnesota 55408.

FOUR INFORMATIVE PLANNING GUIDES

This planning guide is one of four booklets prepared by Honeywell to present a basic discussion of building automation systems, security and fire alarm systems, temperature control systems and preventive maintenance. You are encouraged to send for any of these booklets that may be helpful to you. *Please specify the appropriate form number*. Write to: Honeywell, Inquiry Supervisor M.S. 118, 2701 Fourth Avenue South, Minneapolis, Minnesota 55408. *In Canada*, write to: Honeywell Controls Limited, Commercial Division —Mail Station 350, Vanderhoof Avenue, Toronto 17, Ontario.

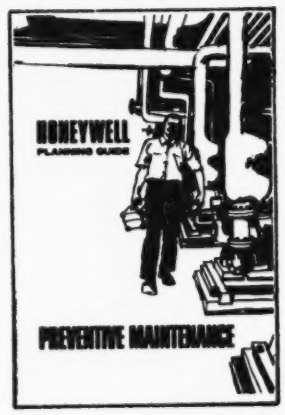


BUILDING AUTOMATION
Form Number 54-0347

This booklet presents a basic discussion of the functions, benefits and economic advantages of various types of automation systems for commercial and institutional buildings.

PREVENTIVE MAINTENANCE
Form No. 54-0350

This guide on maintenance for automatic control systems and mechanical systems tells how a scientific maintenance program can prevent costly, unexpected building system failures.

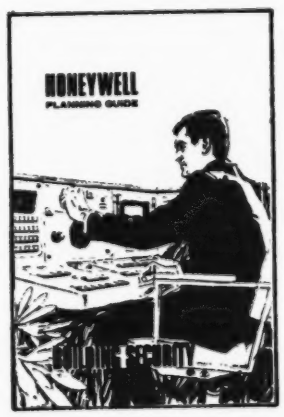


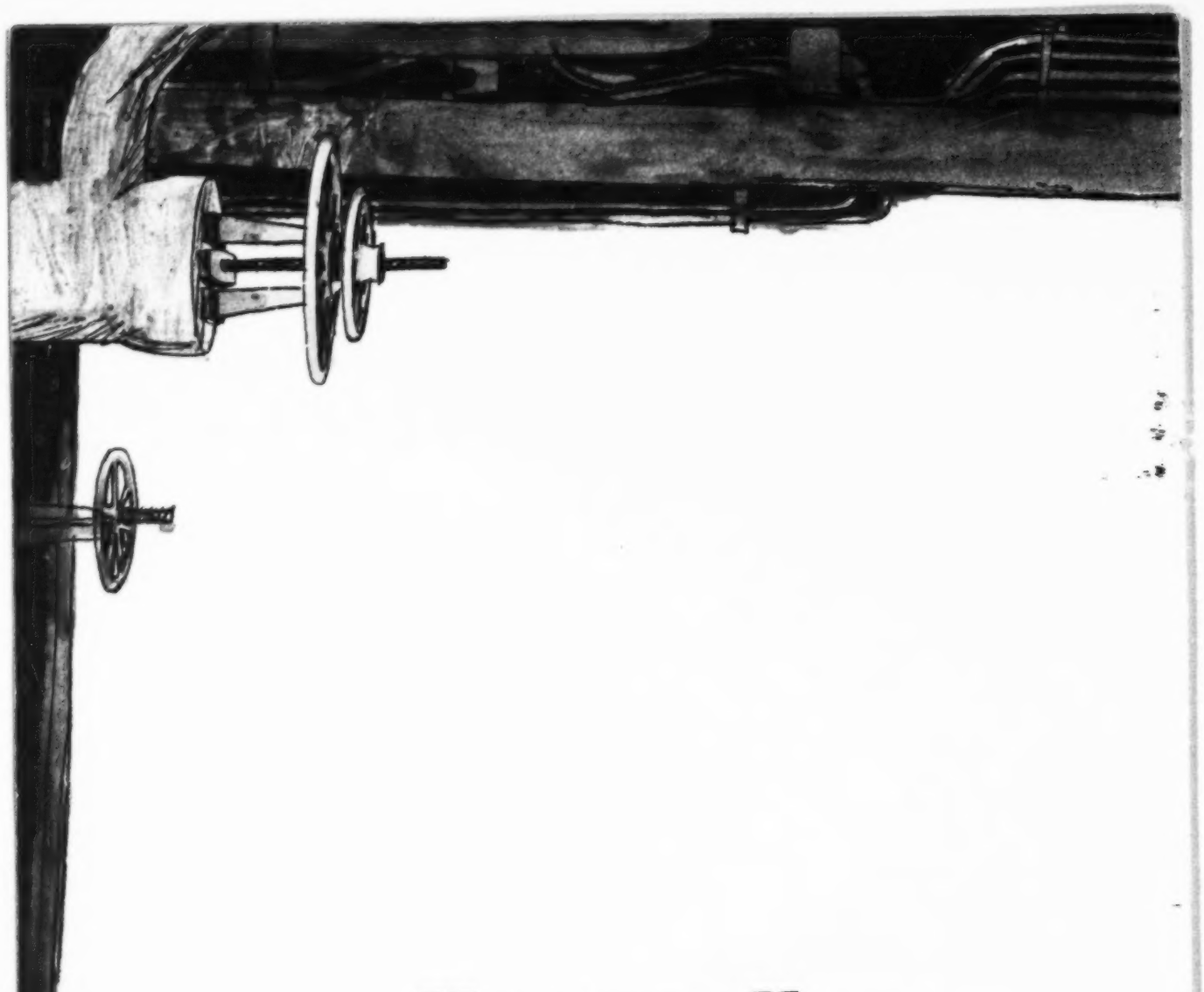
TEMPERATURE CONTROL
Form Number 54-0348

Discussing the important points about heating and cooling control, this booklet tells how to select the right controls for various types of buildings.

BUILDING SECURITY
Form Number 54-0349

This booklet reviews building security systems designed to protect areas, buildings or objects from burglars, intruders and fire. Also discusses the technology of these systems and equipment monitoring.





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